

TERRATEC STAYS AHEAD OF THE CURVE IN BANGKOK



On 26th September 2016, TERRATEC celebrated the successful Factory Acceptance Test of a new 3.20m diameter Earth Pressure Balance Tunnel Boring Machine (EPBM) destined for the Phra Khanong Cable Tunnel Project in Bangkok, Thailand.

The event was attended by representatives of Bangkok's Metropolitan Electricity Authority (MEA) and contractor Nawarat Patanakarn PCL.

Designed to accommodate a new high-voltage cable system, the Phra Khanong Cable Tunnel Project is the first of a series of planned tunnelling projects by the MEA that are being built to meet increased power demands in the Thai capital.

Located at the intersection of the Phra Khanong canal and Sukhumvit Road, the project is situated in one of the busiest areas of downtown Bangkok and is subject to tight

alignment constraints. The machine will be launched from a 7.0m diameter shaft that is being constructed beneath the Ram Inthra - At Narong Expressway (toll road) ramp with little working head room.

The first of two drives for the project will see the TBM head 495m south along Sukhumvit Road, at an upgrade angle of 1.2%, and terminate at a reception shaft located under the BTS Skytrain structure



just short of On Nut Station. From there, the machine will be lifted and transported back to the launch shaft under the expressway ramp.

In order to negotiate the foundation piles of the ramp – and complete its second, 293m-long, drive north under the Phra Khanong canal – the TBM will be launched onto a sharp 32m-radius curve on a 2% up-grade trajectory.

To achieve this, the TERRATEC machine was designed with an X-type articulation system that provides a maximum articulation angle of 6.6-degrees to accommodate a minimum radius curve of 30m. Although this type of extreme TBM articulation is uncommon in the global market it is popular in Japan. TERRATEC therefore teamed up with Japanese manufacturer JTSC to develop the design

with the aim of exporting this technology to other countries.

The TBM's back-up systems are also tailored to accommodate the tight project requirements, including a mucking system that conveys spoil from the TBM's screw to a transfer pipe using air pressure.

Geological conditions along the alignment consist of fine sand and stiff clay, with an average overburden of 26m and a groundwater head of approximately 2 bars.

The TBM's soft ground cutterhead features an open spoke design with the addition of knife bits to assist break-in and break-out of the steel fibre reinforced concrete shaft eyes. Traditional tapered precast concrete segments (left/right/straight) will typically be installed as the machine progresses, with shorter steel segments utilised during the sharp radius curve.

Following the successful factory acceptance test, the machine will now be shipped to Thailand and is expected to arrive by the end of October. Excavation is due to commence in mid-December. Machine operation will be assisted at all times by TERRATEC's highly-experienced Field Service staff, providing quality after sales support to ensure optimum performance and successful project completion. The tunnel is scheduled to go into operation at the end of 2017.

TERRATEC DOUBLE SHIELD TBM PASSES MID-WAY MILESTONE IN LAOS

In early July, a TERRATEC Double Shield TBM passed the mid-way milestone on a 11.5km long tunnel for the Xe-Pian Xe-Namnoy Hydropower Project, in Laos.

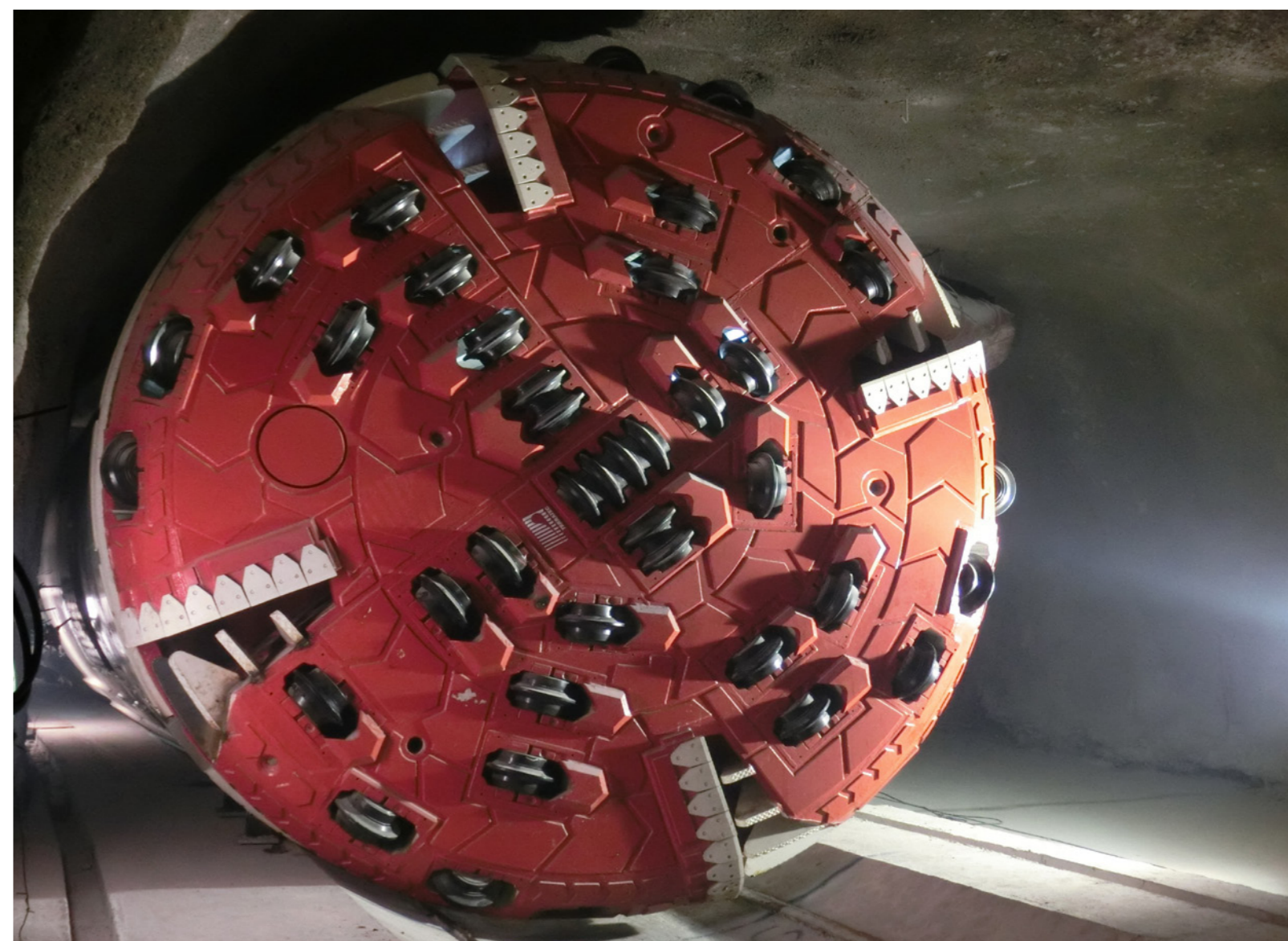
The TBM commenced around the clock boring in July 2015. As of 31st July 2016, tunnel contractor SELI Overseas S.p.A. had completed 6,442m. In the last three months, the machine has achieved

sustained advances of 806m, 824m and 1,004m. For this diameter of shield machine, with rolling stock muck removal, these figures are believed to be a record in South East Asia.

The TBM has bored through various formations, mainly mudstone, sandstone and siltstone with an average Uniaxial Compression Strength (UCS) of 80MPa and peaks of

up to 200MPa in early sections of limestone. The TBM has also passed through fractured zones of rock and successfully crossed three fault zones on its journey to date.

Close cooperation between SELI Overseas and TERRATEC during design, technical solutions, and execution of the drive, has been the key to achieving these record-breaking results.



The remaining 5km of the TBM drive is expected to come to a successful conclusion in early 2017 – several months ahead of schedule – at which point SELI Overseas will hand the tunnel over to SK Engineering & Construction, the main contractor, to complete the project.

TERRATEC has yet again proven the superior design and performance of its Hard Rock TBMs. As a result, several projects in the region have opted for TERRATEC Rock Machines. More information to come in future press releases.



ANOTHER TERRATEC MICROTUNNELLING SYSTEM DELIVERED FOR THAILAND

On 26th August 2016, TERRATEC successfully completed the Factory Acceptance Test of a new Microtunnelling (MTBM) System at its assembly plant in Guangzhou, China. The event was attended by representatives of contractor Drill-Tech Thailand Co., Ltd. The system will be used in the execution of a cable project in Bangkok for the Metropolitan Electricity Authority (MEA).

The MTBM System can push standard DN1800 concrete

pipes and be expanded to work with DN2000 pipes, with the length of each pipe 3000mm.

TERRATEC's scope of supply includes the shield, the main jacking station, intermediate jacking stations, the slurry transport system, a digital guidance system and control container with operation panel and power pack.

The system was designed by TERRATEC at its Engineering Centre in Hobart, Australia.

Production and assembly were carried out at TERRATEC's plant in Guangzhou, with key components coming primarily from Australia and Japan.

The machine will bore through typical Bangkok ground conditions comprising of clay, stiff clay and very stiff clay. State-of-the art features include a cone crusher integrated into the cutterhead structure, the Enzan-Terratec laser guidance system and remote access for the complete tunnelling system.



IN THE MEDIA



TERRATEC's record-breaking Double Shield TBM was featured in the latest issue of Tunnelling Journal. [Click here to read the full article.](#)

WHEREABOUTS

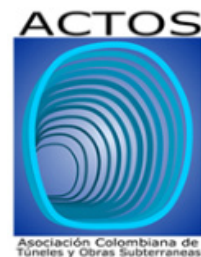
Meet TERRATEC at the following conferences and exhibitions!



Cutting Edge 2016
Nov 7-9 | Los Angeles, USA



4th GMS (Laos) Power Summit
Nov 8-10 | Vientiane, Laos



Tuneles y Obras Subterráneas
Nov 8-10 | Bogotá, Colombia



TBMs in Difficult Ground
Nov 16-18 | Istanbul, Turkey



IMME 2016
Nov 16-19 | Kolkata, India



Bauma CONEXPO India 2016
Dec 12-15 | Delhi, India

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